

AMENDMENTS TO THE CLAIMS

Following is a listing of all claims in the present application, which listing supersedes all previously presented claims:

Listing of Claims:

1. (Currently Amended) An apparatus for cleaning a wafer, comprising:
a processing chamber for performing a cleaning process;
a wafer load chamber for loading the wafer, the wafer load chamber connected to a first sidewall of the processing chamber;
a wafer unload chamber connected to a second sidewall of the processing chamber;
a plurality of holders for contacting and securing peripheral portions of the [[a]] wafer, and for rotating the wafer;
a first plate disposed to face a first surface of the wafer, the first plate having a plurality of first nozzles for spraying a first cleaning solution onto the first surface of the wafer; and
a second plate installed in the processing chamber and disposed to face a second surface of the wafer that is opposite to the first surface, the second plate having a plurality of second nozzles for spraying a second cleaning solution onto the second surface of the wafer,
wherein the holders and the first plate are connected to each other, and the holders and the first plate move from the wafer load chamber into the processing chamber to load the wafer and move from the processing chamber into the wafer unload chamber to unload the wafer.

2. (Original) The apparatus for cleaning a wafer as claimed in claim 1, wherein the first plate has a disc shape corresponding to a shape of the wafer, and the plurality of first nozzles are radially disposed.

3. (Original) The apparatus for cleaning a wafer as claimed in claim 2, wherein cross-sectional areas of the plurality of first nozzles gradually decrease from a central first nozzle located at a central portion of the first plate to one of the plurality of first nozzles located at a peripheral portion of the first plate.

4. (Original) The apparatus for cleaning a wafer as claimed in claim 3, wherein the second plate has a disc shape corresponding to a shape of the wafer, and the plurality of second nozzles are radially disposed.

5. (Original) The apparatus for cleaning a wafer as claimed in claim 4, wherein cross-sectional areas of the plurality of second nozzles gradually decrease from a central second nozzle located at a central portion of the second plate to one of the plurality of second nozzles located at a peripheral portion of the second plate.

6. (Original) The apparatus for cleaning a wafer as claimed in claim 1, wherein a first passage is formed in the first plate for connecting the plurality of first nozzles, and the first passage is connected to a first cleaning solution supplying line for supplying the first cleaning solution.

7. (Original) The apparatus for cleaning a wafer as claimed in claim 1, wherein a second passage is formed in the second plate for connecting the plurality of second nozzles, and the second passage is connected to a second cleaning solution supplying line for supplying the second cleaning solution.

8. (Original) The apparatus for cleaning a wafer as claimed in claim 1, wherein a cross-sectional area of each of the plurality of first nozzles and each of the plurality of second nozzles gradually increases toward the wafer in a longitudinal direction.

9. (Original) The apparatus for cleaning a wafer as claimed in claim 1, wherein each of the plurality of first nozzles located away from a center of the first plate and each of the plurality of second nozzles located away from a center of the second plate are inclined toward the peripheral portion of the wafer.

10. (Original) The apparatus for cleaning a wafer as claimed in claim 1, wherein the first plate further comprises:

a plurality of third nozzles for spraying a first drying gas onto the first surface of the wafer cleaned with the first cleaning solution, and a third passage for connecting the plurality of third nozzles, the third passage being connected to a first drying gas supplying line for supplying the first drying gas.

11. (Cancelled).

12. (Original) The apparatus for cleaning a wafer of claim 1, wherein the plurality of holders comprises:

a first holder disposed at a location corresponding to a flat zone portion of the wafer and a plurality of second holders disposed at a location corresponding to a circumferential portion of the wafer, the first holder including a first gripping groove corresponding to the flat zone portion of the wafer, and each of the plurality of second holders including second gripping grooves corresponding to the circumferential portions of the wafer.

13. (Original) The apparatus for cleaning a wafer as claimed in claim 12, wherein the first holder further includes a first draining hole for discharging the first and the second cleaning solutions moving toward the first holder due to a rotation of the wafer after the first and the second cleaning solutions are provided onto the wafer, the first draining hole penetrating an interior portion of the first gripping groove facing a first side of the flat zone portion of the wafer and extending in a radial direction with respect to the wafer; and

each of the plurality of second holders further includes a second draining hole for discharging the first and the second cleaning solutions moving toward the plurality of second holders due to the rotation of the wafer after the first and the second cleaning solutions are provided onto the wafer, each of the second draining holes penetrating interior portions of each of the plurality of second gripping grooves facing a second side surface of the circumferential portion of the wafer and extending in the radial direction with respect to the wafer.

14. (Withdrawn) The apparatus for cleaning a wafer as claimed in claim 1, wherein each of the holders comprises:

a gripping groove for gripping securing the peripheral portion of the wafer, and a protruding portion for contacting a side surface of the wafer, the protruding portion being formed at interior portion of the gripping groove facing the side surface of the wafer.

15. (Withdrawn) The apparatus for cleaning a wafer as claimed in claim 14, wherein each of the holders further comprises:

a draining hole for discharging the first and the second cleaning solutions moving toward the holders due to a rotation of the wafer after the first and the second cleaning solutions are provided onto the wafer, the draining hole penetrating the interior portion of the gripping groove in a radial direction with respect to the wafer.

16. (Withdrawn) The apparatus for cleaning a wafer as claimed in claim 15, wherein the protruding portion is two protrusions extending from the interior portion of the gripping groove, the two protrusions being disposed one on either side of the draining hole.

17. (Withdrawn) The apparatus for cleaning a wafer as claimed in claim 16, wherein the two protrusions have a semicircular shape.

18. (Withdrawn) The apparatus for cleaning a wafer as claimed in claim 15, wherein the draining hole is two draining holes penetrating the interior portion of the gripping grove, the two draining holes being disposed one on either side of the protruding portion.

19. (Withdrawn) The apparatus for cleaning a wafer as claimed in claim 18, wherein the protruding portion has a semicircular shape.

20. (Withdrawn) The apparatus for cleaning a wafer as claimed in claim 1, wherein each of the holders includes a gripping groove for gripping the peripheral portion of the wafer, and an insertion groove for receiving the peripheral portion of the wafer, the insertion groove being formed at interior portion of the gripping groove facing with a side surface of the wafer.

21. (Withdrawn) The apparatus for cleaning a wafer as claimed in claim 20, wherein the insertion groove has a shape of the letter "V."

22. (Currently Amended) The apparatus for cleaning a wafer as claimed in claim 1, further comprising:

a first driving part for rotating the wafer;

a second driving part for swinging the plurality of holders toward the peripheral portion of the wafer so that the plurality of holders can contact and secure the peripheral portion of the wafer; [[and]]

a plurality of connecting rods for connecting the second driving part to the plurality of holders;

a third driving part for lowering and raising the holders and the first plate; and

a fourth driving part for transferring the holders and the first plate from the wafer load chamber to the wafer unload chamber through the processing chamber to load and unload the

wafer,

wherein the third driving part includes:

a ball guide extending from the wafer load chamber into the wafer unload chamber through the processing chamber;

a ball screw installed in the ball guide;

a motor connected to the ball screw for providing a rotational force; and

a ball block slidably combined with the ball guide for connecting the first driving part to the ball screw, the ball block linearly reciprocating due to the rotational force of the motor.

23. (Original) The apparatus for cleaning a wafer as claimed in claim 1, further comprising:

a first driving part for rotating the first plate in a direction opposite to a rotational direction of the wafer;

a first driving shaft for connecting the first plate to the first driving part;

a second driving part for rotating the second plate in a direction opposite to the rotational direction of the wafer; and

a second driving shaft for connecting the second plate to the second driving part.

24. (Original) The apparatus for cleaning a wafer as claimed in claim 1, further comprising:

a first driving part for moving the holders to adjust a distance interval between the first plate and the wafer secured by the plurality of holders; and

a second driving part for moving the first plate to adjust a distance interval between the first plate and the second plate.

25. (Currently Amended) An apparatus for cleaning a wafer, comprising:

a processing chamber for performing a cleaning process;

a wafer load chamber for loading the wafer, the wafer load chamber connected to a first sidewall of the processing chamber;

a wafer unload chamber connected to a second sidewall of the processing chamber;

a plurality of holders for gripping peripheral portions of a wafer;

a first plate disposed to face a first surface of the wafer and connected to the holders, the first plate having a disc shape corresponding to a shape of the wafer and a plurality of first nozzles for spraying a first cleaning solution on the first surface of the wafer;

a second plate disposed to face a second surface of the wafer that is opposite to the first surface of the wafer, the second plate having a disc shape corresponding to a shape of the wafer and a plurality of second nozzles for spraying a second cleaning solution on the second surface of the wafer;

a first driving part connected to the first plate for rotating the first plate in a first direction;

a second driving part connected to the second plate for rotating the second plate in the first direction;

a third driving part connected to the plurality of holders for rotating the wafer secured by the plurality of holders in a second direction, which is opposite to the first direction;

[[and]]

a fourth driving part for swinging the plurality of holders toward the peripheral portions of the wafer so that the plurality of holders can contact and secure the peripheral portions of the wafer;

a fifth driving part for lowering and raising the holders and the first plate; and

a sixth driving part for transferring the holders and the first plate from the wafer load chamber to the wafer unload chamber through the processing chamber to load and unload the wafer.

26. (Currently Amended) An apparatus for cleaning a wafer, comprising:

a first plate having a plurality of first nozzles for spraying a first cleaning solution onto a first surface of a wafer;

a plurality of holders for contacting and securing peripheral portions of the wafer to face the first plate, and for rotating the wafer, the holders being connected to the first plate;

a second plate having a plurality of second nozzles for spraying a second cleaning solution onto a second surface of the wafer, the second plate being disposed to face the second surface of the wafer;

a first driving part connected to the plurality of holders for swinging the plurality of holders toward the peripheral portions of the wafer so that the plurality of holders can contact and secure the peripheral portions of the wafer;

a second driving part connected to the first driving part for rotating the wafer secured by the plurality of holders;

transferring means for transferring the wafer treated with the first and the second cleaning solutions into a wafer cassette; [[and]]

a cassette stage for supporting the wafer cassette;

a processing chamber for performing a cleaning process using the first and second cleaning solutions;

a wafer load chamber for loading the wafer, the wafer load chamber connected to a first sidewall of the processing chamber;

a wafer unload chamber connected to a second sidewall of the processing chamber, the transferring means and the cassette stage being installed in the wafer unload chamber; and

a third driving part for moving the first plate and the plurality of holders into the processing chamber in order to load the wafer, and for moving the cleaned wafer from the processing chamber into the wafer unload chamber.

27. (Cancelled).

28. (Currently Amended) The apparatus for cleaning a wafer as claimed in claim 26 [[27]], wherein the third driving part comprises:

a ball guide extending from the wafer load chamber into the wafer unload chamber through the processing chamber;

a ball screw installed in the ball guide;

a motor connected to the ball screw for providing a rotational force; and

a ball block slidably combined with the ball guide for connecting the first driving part to the ball screw, the ball block linearly reciprocating due to the rotational force of the motor.

29. (Currently Amended) The apparatus for cleaning a wafer as claimed in claim 26, further comprising:

a fourth [[third]] driving part connected to the first plate for rotating the first plate in a direction opposite to a rotational direction of the wafer; and

a fifth ~~fourth~~ driving part connected to the second plate for rotating the second plate in a direction opposite to the rotational direction of the wafer.

30. (Currently Amended) The apparatus for cleaning a wafer as claimed in claim 26, further comprising:

a fourth [[third]] driving part connected to the cassette stage for upwardly and downwardly moving the cassette stage.

31. (Original) The apparatus for cleaning a wafer as claimed in claim 30, wherein the transferring means comprises:

a transferring robot that rotates and linearly reciprocates in a horizontal direction for transferring the cleaned wafer into the wafer cassette.

32. (Original) The apparatus for cleaning a wafer as claimed in claim 26, wherein the transferring means comprises:

a transferring robot that rotates and linearly reciprocates in a horizontal direction and a vertical direction for transferring the rinsed wafer into the wafer cassette.